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WILKINSON BARKER KNAUER LLP

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May 31, 2017

VIA HAND DELIVERY

Accepted / Filed

MAY 31 2017

Federal Communications Commission
Office of the Secretary

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554
Attn: Edward Lubetzky

Re: WIBX(AM), Utica, NY (FIN: 168)
File No. BMML-20161115ACX
Amendment to Application

Dear Ms. Dortch:

On behalf of Townsquare Media Licensee of Utica/Rome, Inc., licensee of broadcast station WIBX(AM), Utica, New York, we are submitting the attached amendment to the pending license application for the station, File No. BMML-20161115ACX, at staff request. Please replace the Method of Moments Proof of Performance filed with the application with the attached version.

Should there be any questions regarding this matter, please contact me.

Very truly yours,

Howard M. Liberman

Howard M. Liberman
Counsel to Townsquare Media Licensee of
Utica/Rome, Inc.

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Method of Moments Proof of Performance
and
Application for Modified Station License

WIBX (AM)
Utica, New York
Facility ID 168

950 kHz
5 kW Unlimited Time DA-1

Townsquare Media Licensee of Utica/Rome, Inc.

May 2017

APPLICATION FOR LICENSE
RADIO STATION WIBX-AM Utica, NY
950 kHz 5 kW DA-1

Purpose of Application

Item 1	Analysis of Tower Impedance Measurements to Verify Method of Moments Model
Item 2	Method of Moments Model Details for Towers Driven Individually
Item 3	Method of Moments Model Details for Directional Antenna Pattern
Item 4	Derivation of Operating Parameters for Directional Antenna
Item 5	Array Geometry Statement & Survey
Item 6	Sampling System Measurements
Item 7	Antenna Monitor and Sampling System
Item 8	Reference Field Strength Measurements
Item 9	Direct Measurement of Power

Appendix A	FCC Form 302-AM

Purpose of Application

This engineering exhibit supports an application for a modified station license for WIBX-AM, Utica, NY. Townsquare Media Licensee of Utica/Rome, Inc. ("Townsquare") has elected to re-license WIBX by way of a Method of Moments proof of performance, rather than a traditional measurement based partial proof of performance.

Information is provided herein demonstrating that the directional antenna parameters for the patterns authorized by the station license have been determined in accordance with the requirements of section §73.151(c) of the FCC Rules. The system has been adjusted to produce antenna monitor parameters within +/- 5 percent in ratio and +/- 3 degrees in phase of the modeled values, as required by the Rules.

All measurements used in this report were made by contract engineer Mark Humphrey.

Item 1

Analysis of Tower Impedance Measurements to Verify Method of Moments Model - WIBX

Tower base impedance measurements were made at the locations of the sample system current transformers (the "measurement points") using a Array Solutions PowerAim network analyzer in a calibrated measurement system. The other tower was open circuited at it's measurement point by removing the jumper from the ATU output j-plug.

WIBX measured "measurement point" impedances

Tower	Measured R	Measured X
1 (East)	39.2	44.4
2 (South)	39.5	43.2
3 (West)	37.4	43.9
4 (North)	38.1	39.3

The table above uses the same tower numbering scheme as the CDBS record for WIBX

Circuit calculations were performed to relate the method of moments modeled impedances at the tower base feed points to those at the measurement locations as shown in the diagram titled *Analysis of Tower Impedance Measurements to Verify Method of Moments Model*. The series/parallel equivalent impedance of X_C, X_s and X_{LC} was used in the moment method model as a load at ground level (lumped load) for the open circuited tower. In all cases, the modeled impedance at the reference point is within two ohms of the measured reference point impedance.

Item 2

Method of Moments Model Details for Towers Driven Individually - WIBX

The array of towers was modeled using Expert MININEC Broadcast Professional Ver 14.0. Multiple wires were used to represent each tower because of the differences in tower radius at different elevations. The top and bottom wire end points were specified in feet in the geographic coordinate system, using the theoretical directional antenna specifications for tower spacing and orientation. All segments are less than 10° in length, as required by the Commission's rules.

WIBX Array Geometry and Model

All four elements of the WIBX array are tapered self-supporting towers. All have three faces. These faces taper from a width of 14.5' at the base to 1.5' at the top. Each tower was modeled using 4 wires and 17 segments. The towers were modeled using a four layer "wedding cake" design, with the radius of each wire in the model is equal to 100% of the radius of a circle with a circumference equal to the sum of the widths of the tower sides at the middle elevation of the wire in question.

All towers were modeled with a height of 277.5 feet, which is 107 percent of the actual height of the WIBX towers. Therefore the modeled height relative to the physical height falls within the required range of 75 to 125 percent and each modeled radius falls within the required range of 80 percent to 150 percent of the radius of a circle having a circumference equal to the sum of the widths of the tower faces.

WIBX MININEC Model Node and Wire Numbering

Tower	Base Node Number	Wire Numbers
1	1	1-4
2	18	5-8
3	35	9-12
4	52	13-16

WIBX Tower 1 Driven Others Open Circuited at Current Transformer Location

WIBX

GEOMETRY
Dimensions in feet
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	4.18	3
		0	0	70.		
2	none	0	0	70.	1.43	2
		0	0	110.		
3	none	0	0	110.	1.19	6
		0	0	185.		
4	none	0	0	185.	.716	6
		0	0	277.5		
5	none	258.84	220.5	0	4.18	3
		258.84	220.5	70.		
6	none	258.84	220.5	70.	1.43	2
		258.84	220.5	110.		
7	none	258.84	220.5	110.	1.19	6
		258.84	220.5	185.		
8	none	258.84	220.5	185.	.716	6
		258.84	220.5	277.5		
9	none	342.97	269.	0	4.18	3
		342.97	269.	70.		
10	none	342.97	269.	70.	1.43	2
		342.97	269.	110.		
11	none	342.97	269.	110.	1.19	6
		342.97	269.	185.		
12	none	342.97	269.	185.	.716	6
		342.97	269.	277.5		
13	none	258.84	317.5	0	4.18	3
		258.84	317.5	70.		
14	none	258.84	317.5	70.	1.43	2
		258.84	317.5	110.		
15	none	258.84	317.5	110.	1.19	6
		258.84	317.5	185.		
16	none	258.84	317.5	185.	.716	6
		258.84	317.5	277.5		

Number of wires = 16
current nodes = 68

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	12.5	1	23.3333
segment/radius ratio	1	5.58214	4	21.5317
radius	4	.716	1	4.18

ELECTRICAL DESCRIPTION
Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	950.	0	1	.0120731	.0225364

Sources

source	node	sector	magnitude	phase	type
1	1	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	52	0	-1,359.	0	0	0
2	35	0	-1,359.	0	0	0
3	18	0	-1,359.	0	0	0

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IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
950.	**37.868**	**7.4869**	38.601	11.2	1.3857	-15.828	-.11501

WIBX Tower 2 Driven Others Open Circuited at Current Transformer Location

WIBX

GEOMETRY
Dimensions in feet
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	4.18	3
		0	0	70.		
2	none	0	0	70.	1.43	2
		0	0	110.		
3	none	0	0	110.	1.19	6
		0	0	185.		
4	none	0	0	185.	.716	6
		0	0	277.5		
5	none	258.84	220.5	0	4.18	3
		258.84	220.5	70.		
6	none	258.84	220.5	70.	1.43	2
		258.84	220.5	110.		
7	none	258.84	220.5	110.	1.19	6
		258.84	220.5	185.		
8	none	258.84	220.5	185.	.716	6
		258.84	220.5	277.5		
9	none	342.97	269.	0	4.18	3
		342.97	269.	70.		
10	none	342.97	269.	70.	1.43	2
		342.97	269.	110.		
11	none	342.97	269.	110.	1.19	6
		342.97	269.	185.		
12	none	342.97	269.	185.	.716	6
		342.97	269.	277.5		
13	none	258.84	317.5	0	4.18	3
		258.84	317.5	70.		
14	none	258.84	317.5	70.	1.43	2
		258.84	317.5	110.		
15	none	258.84	317.5	110.	1.19	6
		258.84	317.5	185.		
16	none	258.84	317.5	185.	.716	6
		258.84	317.5	277.5		

Number of wires = 16
current nodes = 68

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	12.5	1	23.3333
segment/radius ratio	1	5.58214	4	21.5317
radius	4	.716	1	4.18

ELECTRICAL DESCRIPTION
Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	950.	0	1	.0120731	.0225364

Sources

source	node	sector	magnitude	phase	type
1	18	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	52	0	-1,359.	0	0	0
2	35	0	-1,359.	0	0	0
3	1	0	-1,359.	0	0	0

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IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 18, sector 1							
950.	**38.973**	**7.5176**	39.691	10.9	1.3515	-16.509	-9.8E-02

WIBX Tower 3 Driven Others Open Circuited at Current Transformer Location

WIBX

GEOMETRY
Dimensions in feet
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	4.18	3
		0	0	70.		
2	none	0	0	70.	1.43	2
		0	0	110.		
3	none	0	0	110.	1.19	6
		0	0	185.		
4	none	0	0	185.	.716	6
		0	0	277.5		
5	none	258.84	220.5	0	4.18	3
		258.84	220.5	70.		
6	none	258.84	220.5	70.	1.43	2
		258.84	220.5	110.		
7	none	258.84	220.5	110.	1.19	6
		258.84	220.5	185.		
8	none	258.84	220.5	185.	.716	6
		258.84	220.5	277.5		
9	none	342.97	269.	0	4.18	3
		342.97	269.	70.		
10	none	342.97	269.	70.	1.43	2
		342.97	269.	110.		
11	none	342.97	269.	110.	1.19	6
		342.97	269.	185.		
12	none	342.97	269.	185.	.716	6
		342.97	269.	277.5		
13	none	258.84	317.5	0	4.18	3
		258.84	317.5	70.		
14	none	258.84	317.5	70.	1.43	2
		258.84	317.5	110.		
15	none	258.84	317.5	110.	1.19	6
		258.84	317.5	185.		
16	none	258.84	317.5	185.	.716	6
		258.84	317.5	277.5		

Number of wires = 16
current nodes = 68

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	12.5	1	23.3333
segment/radius ratio	1	5.58214	4	21.5317
radius	4	.716	1	4.18

ELECTRICAL DESCRIPTION
Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	950.	0	1	.0120731	.0225364

Sources

source	node	sector	magnitude	phase	type
1	35	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	52	0	-1,359.	0	0	0
2	18	0	-1,359.	0	0	0
3	1	0	-1,359.	0	0	0

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IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 35, sector 1							
950.	**37.867**	**7.4857**	38.6	11.2	1.3857	-15.828	-.11501

WIBX Tower 4 Driven Others Open Circuited at Current Transformer Location

WIBX

GEOMETRY
Dimensions in feet
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	4.18	3
		0	0	70.		
2	none	0	0	70.	1.43	2
		0	0	110.		
3	none	0	0	110.	1.19	6
		0	0	185.		
4	none	0	0	185.	.716	6
		0	0	277.5		
5	none	258.84	220.5	0	4.18	3
		258.84	220.5	70.		
6	none	258.84	220.5	70.	1.43	2
		258.84	220.5	110.		
7	none	258.84	220.5	110.	1.19	6
		258.84	220.5	185.		
8	none	258.84	220.5	185.	.716	6
		258.84	220.5	277.5		
9	none	342.97	269.	0	4.18	3
		342.97	269.	70.		
10	none	342.97	269.	70.	1.43	2
		342.97	269.	110.		
11	none	342.97	269.	110.	1.19	6
		342.97	269.	185.		
12	none	342.97	269.	185.	.716	6
		342.97	269.	277.5		
13	none	258.84	317.5	0	4.18	3
		258.84	317.5	70.		
14	none	258.84	317.5	70.	1.43	2
		258.84	317.5	110.		
15	none	258.84	317.5	110.	1.19	6
		258.84	317.5	185.		
16	none	258.84	317.5	185.	.716	6
		258.84	317.5	277.5		

Number of wires = 16
current nodes = 68

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	12.5	1	23.3333
segment/radius ratio	1	5.58214	4	21.5317
radius	4	.716	1	4.18

ELECTRICAL DESCRIPTION
Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	950.	0	1	.0120731	.0225364

Sources

source	node	sector	magnitude	phase	type
1	52	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	35	0	-1,359.	0	0	0
2	18	0	-1,359.	0	0	0
3	1	0	-1,359.	0	0	0

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IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 52, sector 1							
950.	**38.972**	**7.5162**	39.691	10.9	1.3515	-16.509	-9.8E-02

Item 3

Method of Moments Model Details for Directional Antenna - WIBX

The array of towers was modeled using MININEC with the individual tower characteristics that were verified by the individual tower impedance measurements. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna patterns. The following pages contain details of the method of moments models of the directional antenna patterns.

WIBX Driven Array

```
WIBX

GEOMETRY
Dimensions in feet
Environment: perfect ground

wire  caps Distance     Angle        Z            radius       segs
 1    none 0            0            0            4.18          3
           0            0            70.
 2    none 0            0            70.          1.43          2
           0            0            110.
 3    none 0            0            110.         1.19          6
           0            0            185.
 4    none 0            0            185.         .716          6
           0            0            277.5
 5    none 258.84       220.5        0            4.18          3
           258.84       220.5        70.
 6    none 258.84       220.5        70.          1.43          2
           258.84       220.5        110.
 7    none 258.84       220.5        110.         1.19          6
           258.84       220.5        185.
 8    none 258.84       220.5        185.         .716          6
           258.84       220.5        277.5
 9    none 342.97       269.         0            4.18          3
           342.97       269.         70.
 10   none 342.97       269.         70.          1.43          2
           342.97       269.         110.
 11   none 342.97       269.         110.         1.19          6
           342.97       269.         185.
 12   none 342.97       269.         185.         .716          6
           342.97       269.         277.5
 13   none 258.84       317.5        0            4.18          3
           258.84       317.5        70.
 14   none 258.84       317.5        70.          1.43          2
           258.84       317.5        110.
 15   none 258.84       317.5        110.         1.19          6
           258.84       317.5        185.
 16   none 258.84       317.5        185.         .716          6
           258.84       317.5        277.5

Number of wires          =  16
          current nodes  =  68

                          minimum                  maximum
Individual wires      wire    value            wire  value
segment length         3      12.5              1    23.3333
segment/radius ratio   1      5.58214           4    21.5317
radius                 4      .716              1    4.18
```

ELECTRICAL DESCRIPTION
Frequencies (KHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	950.	0	1	.0120731	.0225364

Sources

source	node	sector	magnitude	phase	type
1	1	1	224.815	75.2	voltage
2	18	1	114.485	156.3	voltage
3	35	1	151.219	344.2	voltage
4	52	1	255.745	263.7	voltage

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IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
950.	**10.64**	**35.896**	37.44	73.5	7.1954	-2.43	-3.6802
source = 2; node 18, sector 1							
950.	**15.147**	**9.0218**	17.63	30.8	3.419	-5.2338	-1.5469
source = 3; node 35, sector 1							
950.	**18.829**	**14.36**	23.68	37.3	2.9071	-6.2297	-1.1819
source = 4; node 52, sector 1							
950.	**6.0477**	**42.998**	43.422	82.	14.434	-1.2055	-6.155
Parallel combination of all sources.							
950,000.	4.82722	5.34254	7.20033	47.9	10.477	-1.6631	-4.9737

CURRENT rms
Frequency = 950 KHz
Input power = 5,000. watts
Efficiency = 100. %
coordinates in feet

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	**9.49434**	**1.7**	9.49024	.278745
2	0	0	23.3333	9.93041	.8	9.9295	.134667
3	0	0	46.6667	9.87436	.4	9.87414	.0661404
END	0	0	70.	9.51681	0.0	9.51681	8.13E-03
2J1	0	0	70.	9.51681	0.0	9.51681	8.13E-03
5	0	0	90.	9.19379	359.9	9.19378	-.014424
END	0	0	110.	8.68293	359.8	8.68287	-.0341335
2J2	0	0	110.	8.68293	359.8	8.68287	-.0341335
7	0	0	122.5	8.31305	359.7	8.31294	-.0430187
8	0	0	135.	7.88265	359.6	7.88249	-.0501765
9	0	0	147.5	7.39617	359.6	7.39596	-.0553969
10	0	0	160.	6.85559	359.5	6.85534	-.0586659
11	0	0	172.5	6.26164	359.5	6.26135	-.0599851
END	0	0	185.	5.59848	359.4	5.59816	-.0593194
2J3	0	0	185.	5.59848	359.4	5.59816	-.0593194
13	0	0	200.417	4.87237	359.3	4.87204	-.0563979
14	0	0	215.833	4.06389	359.3	4.06357	-.0509027
15	0	0	231.25	3.19099	359.2	3.19071	-.042871
16	0	0	246.667	2.25326	359.2	2.25303	-.0322473
17	0	0	262.083	1.23688	359.1	1.23674	-.0187651
END	0	0	277.5	0	0	0	0
GND	-196.824	168.103	0	**10.2675**	**125.5**	-5.96307	8.3584
19	-196.824	168.103	23.3333	10.3111	124.2	-5.78926	8.53242
20	-196.824	168.103	46.6667	10.0668	123.5	-5.55942	8.39249
END	-196.824	168.103	70.	9.54774	122.9	-5.19228	8.01246
2J5	-196.824	168.103	70.	9.54774	122.9	-5.19228	8.01246
22	-196.824	168.103	90.	9.16085	122.7	-4.94789	7.70971
END	-196.824	168.103	110.	8.59305	122.4	-4.60859	7.25268
2J6	-196.824	168.103	110.	8.59305	122.4	-4.60859	7.25268
24	-196.824	168.103	122.5	8.19698	122.3	-4.37915	6.92918
25	-196.824	168.103	135.	7.74502	122.2	-4.12181	6.55714
26	-196.824	168.103	147.5	7.24228	122.	-3.83976	6.14059
27	-196.824	168.103	160.	6.69089	121.9	-3.53429	5.68127
28	-196.824	168.103	172.5	6.09165	121.8	-3.20593	5.17979
END	-196.824	168.103	185.	5.42889	121.6	-2.84633	4.6229
2J7	-196.824	168.103	185.	5.42889	121.6	-2.84633	4.6229
30	-196.824	168.103	200.417	4.70975	121.5	-2.45992	4.01628
31	-196.824	168.103	215.833	3.91595	121.4	-2.0375	3.34414
32	-196.824	168.103	231.25	3.06546	121.2	-1.58897	2.6215
33	-196.824	168.103	246.667	2.15817	121.1	-1.11447	1.84815
34	-196.824	168.103	262.083	1.1812	121.	-.60766	1.0129
END	-196.824	168.103	277.5	0	0	0	0
GND	-5.98561	342.918	0	**10.0971**	**306.9**	6.05936	-8.07683
36	-5.98561	342.918	23.3333	10.2253	305.2	5.89676	-8.35377
37	-5.98561	342.918	46.6667	10.023	304.4	5.66963	-8.26532
END	-5.98561	342.918	70.	9.54051	303.8	5.30165	-7.93183
2J9	-5.98561	342.918	70.	9.54051	303.8	5.30165	-7.93183
39	-5.98561	342.918	90.	9.16828	303.5	5.05499	-7.64882
END	-5.98561	342.918	110.	8.61367	303.2	4.71125	-7.21106
2J10	-5.98561	342.918	110.	8.61367	303.2	4.71125	-7.21106
41	-5.98561	342.918	122.5	8.22372	303.	4.47826	-6.89745

42	-5.98561	342.918	135.	7.77682	302.8	4.21658	-6.53448
43	-5.98561	342.918	147.5	7.27794	302.7	3.92946	-6.12599
44	-5.98561	342.918	160.	6.72916	302.5	3.61815	-5.67368
45	-5.98561	342.918	172.5	6.13124	302.4	3.2832	-5.1781
END	-5.98561	342.918	185.	5.4685	302.2	2.91606	-4.62613
2J11	-5.98561	342.918	185.	5.4685	302.2	2.91606	-4.62613
47	-5.98561	342.918	200.417	4.74782	302.1	2.52119	-4.02311
48	-5.98561	342.918	215.833	3.95067	301.9	2.08909	-3.35314
49	-5.98561	342.918	231.25	3.09499	301.8	1.62985	-2.63108
50	-5.98561	342.918	246.667	2.18059	301.6	1.14362	-1.85664
51	-5.98561	342.918	262.083	1.19435	301.5	.623808	-1.0185
END	-5.98561	342.918	277.5	0	0	0	0
GND	190.837	174.87	0	**9.31262**	**181.7**	-9.30844	-.278853
53	190.837	174.87	23.3333	9.84235	181.2	-9.84016	-.207444
54	190.837	174.87	46.6667	9.83056	181.	-9.82908	-.170355
END	190.837	174.87	70.	9.51056	180.8	-9.5096	-.13525
2J13	190.837	174.87	70.	9.51056	180.8	-9.5096	-.13525
56	190.837	174.87	90.	9.20221	180.7	-9.20143	-.119311
END	190.837	174.87	110.	8.70429	180.7	-8.70369	-.102467
2J14	190.837	174.87	110.	8.70429	180.7	-8.70369	-.102467
58	190.837	174.87	122.5	8.34029	180.6	-8.33978	-.0930471
59	190.837	174.87	135.	7.9147	180.6	-7.91426	-.0837236
60	190.837	174.87	147.5	7.43177	180.6	-7.4314	-.0746416
61	190.837	174.87	160.	6.89351	180.5	-6.89319	-.0658141
62	190.837	174.87	172.5	6.3006	180.5	-6.30034	-.0572274
END	190.837	174.87	185.	5.63719	180.5	-5.63698	-.0486611
2J15	190.837	174.87	185.	5.63719	180.5	-5.63698	-.0486611
64	190.837	174.87	200.417	4.90935	180.5	-4.90918	-.0403092
65	190.837	174.87	215.833	4.09742	180.4	-4.0973	-.0320125
66	190.837	174.87	231.25	3.21935	180.4	-3.21926	-.023958
67	190.837	174.87	246.667	2.27467	180.4	-2.27461	-.016132
68	190.837	174.87	262.083	1.24939	180.4	-1.24936	-8.44E-03
END	190.837	174.87	277.5	0	0	0	0

CURRENT MOMENTS(amp-feet) rms

Frequency = 950 KHz
Input power = 5,000. watts

wire	magnitude	phase (deg)	vertical current moment magnitude	phase (deg)
1	294.789	.7	294.789	.7
2	157.711	359.9	157.711	359.9
3	236.27	359.6	236.27	359.6
4	122.386	359.3	122.386	359.3
5	304.579	124.	304.579	124.
6	157.172	122.7	157.172	122.7
7	231.569	122.1	231.569	122.1
8	117.922	121.3	117.922	121.3
9	302.368	305.	302.368	305.
10	157.294	303.5	157.294	303.5
11	232.658	302.7	232.658	302.7
12	118.97	301.9	118.97	301.9
13	292.526	181.2	292.526	181.2
14	157.848	180.7	157.848	180.7
15	237.357	180.6	237.357	180.6
16	123.397	180.4	123.397	180.4

Medium wave array vertical current moment (amps-feet) rms
(Calculation assumes tower wires are grouped together.
The first wire of each group must contain the source.)

tower	magnitude	phase (deg)
1	811.119	0.0
2	811.119	122.8
3	811.119	303.6
4	811.119	180.8

Comparison of Current Moments with Theoretical Antenna Field Parameters

Tower	Current Moment Magnitude	Current Moment Phase	Normalized Magnitude	Normalized Phase	Standard Pattern Ratio	Standard Pattern Phase
1	811.119	0.0°	1.0	-151.8°	1.0	-151.8°
2	811.119	122.8°	1.0	-29.0°	1.0	-29.0°
3	811.119	303.6°	1.0	151.8°	1.0	151.8°
4	811.119	180.8°	1.0	29.0°	1.0	29.0°

As shown in the tables above, the base currents used in the Method of Moments computer model produce current moments in each of the towers that are identical to the field ratios and phases of the theoretical antenna parameters specified in the WIBX station license.

Item 4

Derivation of Operating Parameters for Directional Antennas - WIBX

The currents at the tower reference points have been calculated by using the computer circuit simulation program pspice. A pspice model has been made for each tower using the antenna base currents and base impedances calculated by MININEC and shown above, and the reactances listed previously in the table *Analysis of Tower Impedance Measurements to Verify Method of Moments Model*. The magnitude and phase of the current source in the pspice model (IIN) was adjusted such that the current calculated in the output branch of the pspice model (the current through resistor R_L) was the same as the base current for the tower calculated by MININEC. The current at the reference point is the current source in the pspice model. These calculated currents are then normalized to the reference tower to obtain the antenna monitor phase and ratio readings, as shown in the tables labeled Antenna Monitor Parameters, which follow the pspice data below.

```
 ## WIBX TOWER 1 BASE MODEL

 ****     CIRCUIT DESCRIPTION

******************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 950kHz 950kHz

IIN             0                       1       AC 13.09 2.161
LXlc            1                       2               5026uH
Rlc             2                       0               .001ohms
LXs             1                       3               6.366uH
CXc             3                       0               129pF
LL              3                       4               6.0137uH
RL              4                       0               10.64ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END


 ****     ELEMENT NODE TABLE


0               RL          CXc         IIN         Rlc

1               IIN         LXs         LXlc

2               Rlc         LXlc

3               LL          CXc         LXs

4               LL          RL




 ****     AC ANALYSIS                        TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   9.500E+05   1.343E+01    1.700E+00
```

```
 ## WIBX TOWER 2 BASE MODEL

 ****     CIRCUIT DESCRIPTION

******************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 950kHz 950kHz

IIN             0                       1       AC 14.44 126.1
LXlc            1                       2               5026uH
Rlc             2                       0               .001ohms
LXs             1                       3               6.2uH
CXc             3                       0               129pF
LL              3                       4               1.5155uH
RL              4                       0               15.147ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END


 ****     ELEMENT NODE TABLE


0               RL          CXc         IIN         Rlc

1               IIN         LXs         LXlc

2               Rlc         LXlc

3               LL          CXc         LXs

4               LL          RL


 ****     AC ANALYSIS                     TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   9.500E+05   1.452E+01    1.255E+02
```

```
 ## WIBX TOWER 3 BASE MODEL

 ****     CIRCUIT DESCRIPTION

******************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 950kHz 950kHz

IIN             0                       1       AC 14.15 -52.3
LXlc            1                       2               5026uH
Rlc             2                       0               .001ohms
LXs             1                       3               6.366uH
CXc             3                       0               129pF
LL              3                       4               2.406uH
RL              4                       0               18.829ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END


 ****     ELEMENT NODE TABLE


0               RL          CXc         IIN         Rlc

1               IIN         LXs         LXlc

2               Rlc         LXlc

3               LL          CXc         LXs

4               LL          RL


 ****     AC ANALYSIS                        TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   9.500E+05   1.428E+01   -5.310E+01
```

```
 ## WIBX TOWER 4 BASE MODEL

 ****     CIRCUIT DESCRIPTION

******************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 950kHz 950kHz

IIN             0                       1       AC 12.77 -178
LXlc            1                       2               5026uH
Rlc             2                       0               .001ohms
LXs             1                       3               5.529uH
CXc             3                       0               129pF
LL              3                       4               7.2033uH
RL              4                       0               6.0477ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END


 ****     ELEMENT NODE TABLE


0               RL          CXc         IIN         Rlc

1               IIN         LXs         LXlc

2               Rlc         LXlc

3               LL          CXc         LXs

4               LL          RL


 ****     AC ANALYSIS                        TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   9.500E+05   1.317E+01   -1.783E+02
```

Antenna Monitor Parameters - WIBX

Tower	Ref Point Current Magnitude	Ref Point Current Phase	Normalized Magnitude	Normalized Phase
1 (North)	12.77	-178.0°	0.902	-125.7°
2 (East)	13.09	2.161	0.925	54.5°
3 (West)	14.15	-52.3°	1.0	0°
4 (South)	14.44	126.1°	1.020	178.4°

The table above uses the same tower numbering scheme as the WIBX antenna monitor, which differs from the CDBS

Item 5

Post Construction Array Geometry Statement & Survey - WIBX

Because the WIBX antenna system has been previously licensed via a traditional measurement based proof of performance and there have been no changes made to the theoretical antenna parameters, a post-construction survey is not required per FCC Public Notice DA 09-2340. (October 29, 2009)

Item 6

Sampling System Measurements - WIBX

Impedance measurements were made of the antenna monitor sampling system using an Array Solutions PowerAim network analyzer in a calibrated measurement system. The measurements were made looking into the antenna monitor ends of the sampling lines for two conditions – with and without the sampling lines connected to the sampling transformers at the antenna tuning units.

The following table shows the frequency closest to the carrier frequency where series resonance – zero reactance corresponding with low resistance – was found. As frequencies of resonance occur at odd multiples of 90 degrees electrical length, the sampling line length at the resonant frequency above carrier frequency – which is the closest one to the carrier frequency – was found to be 90 electrical degrees. The electrical length at carrier frequency appearing in the table below was calculated by ratioing the carrier frequency to the resonant frequency.

WIBX Sample Line Measurements

Tower	Sample Line Open-Circuited Resonant Frequency (kHz)	Sample Line Electrical Length in Degrees at 950 kHz	Measured Impedance at 950 kHz with Sample TCT Connected
1	753.4	340.5	46.6 +j1.4
2	751.9	341.1	51.7 +j0.6
3	752.4	340.9	46.9 +j0.9
4	751.9	341.1	47.7 +j2.2

The sample line lengths meet the requirement that they be equal in length to within 1 electrical degree.

In order to determine the characteristic impedance values of the sampling lines, open-circuited measurements were made with frequencies offset to produce +/- 45 degrees of electrical length from resonance. The characteristic impedance was calculated using the following formula, where R1 +j X1 and R2 +j X2 are the measured impedances at the +45 and –45 degree offset frequencies, respectively:

$$Zo = ((R_1^2 + X_1^2)^{1/2} \times (R_2^2 + X_2^2)^{1/2})^{1/2}$$

WIBX Sample Line Characteristic Impedance Calculations

Tower	-45° Offset Frequency (KHz)	-45° Measured Impedance (Ohms)	+45° Offset Frequency (kHz)	+45° Measured Impedance (Ohms)	Calculated Characteristic Impedance (Ohms)
1	627.8	6.2 -j48.8	879.0	9.1 +j48.6	49.3
2	626.6	7.1 -j48.1	877.2	10.3 +j48.1	48.9
3	627.0	6.1 -j48.2	877.8	9.2 +j48.5	49.0
4	626.6	6.2 -j48.9	877.2	9.1 +j48.8	49.5

The sample line measured characteristic impedances meet the requirement that they be equal within 2 ohms.

Item 7

Antenna Monitor and Sampling System - WIBX

The antenna monitor is a Potomac Instruments model 19 (204). The sample transformers, which are Delta TCT toroidial current transformers, are connected through equal lengths of 3/8" Phelps-Dodge cable to the antenna monitor. The sample lines are routed to the towers such that they are subject to similar environmental conditions. The antenna monitor was tested by feeding a single RF source through a "T" connector, with the outputs of the "T" then fed to the two antenna monitor inputs. In this configuration, the antenna monitor indicates a ratio of 1.00 and a phase angle of zero for both towers.

The sample current transformers were tested by feeding their outputs to the "A" and "B" inputs of the network analyzer, while feeding the amplified output of the network analyzer through the sample transformers into a resistive load. The measurements of the sample transformers are summarized in the table below.

Transformer/Tower#	Indicated Ratio	Indicated Phase
1	1.000	0
2	1.001	+0.1
3	1.000	0
4	0.998	-0.1

Item 8

Reference Field Strength Measurements - WIBX

Reference field strength measurements were made along the monitor point radials specified in the current station license (the null radials), and on the radial of the line of the towers in the direction of maximum radiation. The transmitter output power was adjusted to 5.4 kW

The measured field strengths and descriptions and GPS coordinates for the reference measurement points are shown below. All GPS coordinates are NAD83. All readings were taken with a Potomac Instruments FIM-41 field intensity meter, serial #2170. This meter was calibrated by the manufacturer in April 2016. All measurements were taken by WIBX engineer Robert Carter.

Directions to Reference points on Radial 170

1. From WIBX Transmitter Site:

Travel west on Clarks Mills Rd. to the intersection of Highway 840. Turn on to Highway 840 East, travel to Middle Settlement Rd. exit. Travel south to Seneca Turnpike. Turn on to Seneca Turnpike west and travel .73 kilometers. Take reading on south shoulder of the road. (8303 Seneca Turnpike, Clinton NY)

2.28 km 32 mV Lat. 43° 5' 1.1" Long 75° 20' 5.6"

2. From WIBX Transmitter Site:

Travel west on Clarks Mills Rd. to the intersection of Highway 840. Turn on to Highway 840 East, travel to Middle Settlement Rd. exit. Travel south to Seneca Turnpike. Turn and travel east on Seneca Turnpike until you reach Highway 12 B. Turn south on Highway 12 B and drive for 1.87 kilometers. Take Reading on south shoulder of the road at the foot of private driveway. (114 Clinton Rd. New Hartford NY)

3.72 km 10 mV Lat. 43° 4' 16.1" Long 75° 19' 48.0"

3. From WIBX Transmitter Site:

Travel west on Clarks Mills Rd. to the intersection of Highway 840. Turn on to Highway 840 East, travel to Middle Settlement Rd. exit. Travel south to Seneca Turnpike. Turn and travel east on Seneca Turnpike until you reach Highway 12/Paris Rd. Turn and drive south on Highway 12/Paris Rd for 2.4 kilometers. Turn on to private driveway. Travel .63 kilometers and take reading. (4067 NY-12 New Hartford NY)

5.15 km 4.5 mV Lat. 43° 3' 30.7" Long 75° 19' 35.5"

Directions to Reference points on Radial 227

1. From WIBX Transmitter Site:

Travel west on Clarks Mills Rd. to the intersection of Highway 840. Turn on to Highway 840 East, travel to Middle Settlement Rd. exit. Travel south to Seneca Turnpike. Turn on to Seneca Turnpike west and travel 2.52 kilometers. Turn north into Applewood Community and travel 1.1 kilometers. Take reading on north shoulder of Annie's Way.
(804 Annie's Way, Clinton NY)

2.0 km 9 mV Lat. 43° 5' 29.9" Long 75° 21' 36.3"

2. From WIBX Transmitter Site:

Travel west on Clarks Mills Rd. until you reach Clinton St. Turn south on to Clinton St and drive for 1.25 kilometers. Take reading at Clinton St and north shoulder of Pleasant Run intersection. (4624 Clinton St. Clinton NY)

3.49 km 7.2 mV Lat. 43° 4' 58.4" Long 75° 22' 25.1"

3. From WIBX Transmitter Site:

Travel west on Clarks Mills Rd. until you reach Clinton St. Turn south on to Clinton St and drive to Highway 5. Turn west on to Highway 5/West Seneca Turnpike. Turn on to Old Bristol Rd and travel .3 kilometers. Take reading on eastern side of the road.
(7579 Old Bristol Rd. Clinton, NY)

4.87 km 5.4 mV Lat. 43° 4' 29.2" Long 75° 23' 10.1"

Directions to Reference points on Radial 271

1. From WIBX Transmitter Site:

Travel west on Clarks Mills Rd until you reach Clinton St. Turn north on Clinton St as it becomes Westmoreland Rd. Travel .9 kilometers. Take reading on west shoulder of the highway. (5019 Westmoreland Rd. Whitesboro, NY)

2.41 km 25 mV Lat. 43° 6' 7.8" Long 75° 22' 14.5"

2. From WIBX Transmitter Site:

Travel west on Clarks Mills Rd until you reach Clinton St. Turn south on to Clinton St and travel until you reach E. South St. Turn and go west on E. South St. until you reach Stop 7 Rd. Turn and go north on Stop 7 Rd. for .89 kilometers. Take reading on west shoulder of the highway. (4891 Stop 7 Rd. Whitesboro, NY)

3.57 km 3.9 mV Lat. 43° 6' 2.9" Long 75° 23' 6.2"

3. From WIBX Transmitter Site:

Travel west on Clarks Mills Rd until you reach Clinton St. Turn south on to Clinton St and travel until you reach highway 233. Turn north on to highway 233 and go . 5 kilometers. Take reading on the west shoulder of the highway.
(4827 NY 233 Westmoreland, NY)

4.83 km 2.1 mV Lat. 43° 5' 58.6" Long 75° 24' 0.9"

Directions to Reference points on Radial 48

1. From WIBX Transmitter Site:

Travel east on Clarks Mills Rd until you reach Oriskany Blvd. Turn north on to Oriskany Blvd and go to Westmoreland St. Turn and go west on to Westmoreland St. as it becomes Westmoreland Rd. and travel 1.4 kilometers to Kurts Kourt. Travel .68 kilometers to Matts Dr. Take reading on southern side of the intersection.
(600 Matts Dr. Whitesboro, NY)

2.52 km 20 mV Lat. 43° 7' 7.6" Long 75° 19' 5.5"

2. From WIBX Transmitter Site:

Travel east on Clarks Mills Rd until you reach Oriskany Blvd. Turn north on to Oriskany Blvd and go to Westmoreland St. Turn and go west on to Westmoreland St. as it becomes Westmoreland Rd. and travel .87 kilometers. Turn north on to Denton Ave and go to Waterbury Ave. Take reading on the eastern side of the intersection.
(116 Waterbury Ave. Whitesboro, NY)

3.89 km 5.1 mV Lat. 43° 7' 36.4" Long 75° 18' 19.1"

3. From WIBX Transmitter Site:

Travel east on Clarks Mills Rd until you reach Oriskany Blvd. Turn north on to Oriskany Blvd and go to Wood Rd. Turn east on to Wood Rd. to Main St. Turn south on to Main St. and go 68 meters. Make measurement on the east side of the street.
(254 Main St. Whitesboro, NY)

4.6 km 6.1 mV Lat. 43° 7' 54.4" Long 75° 17' 55.6"

Directions to Reference points on Radial 346

1. From WIBX Transmitter Site:

Travel east on Clarks Mills Rd to Halsey Rd. and travel 1.14 kilometers to S.R Sloan Inc. Turn north into the driveways of S.R. Sloan and travel .87 kilometers. Take reading on the north side of the driveway. (8111 Halsey Rd. Whitesboro, NY)

1.32 km 600 mV Lat. 43° 6' 52.8" Long 75° 20' 51.9"

2. From WIBX Transmitter Site:

Travel east on Clarks Mills Rd to Halsey Rd. Turn west on to Halsey Rd. to Judd Rd/Highway 840. Turn north on to Judd Rd/Highway 840 and travel 3.49 kilometers to Old Judd Rd. Turn west on to Old Judd Rd. and travel 1.14 kilometers to Walter Rd. Take reading at the southern corner of the shoulder of the road, at the intersection.
(8050 Humphrey Rd. Oriskany, NY)

3.21 km 300 mV Lat. 43° 7' 53.6" Long 75° 21' 2.1"

3. From WIBX Transmitter Site:

Travel east on Clarks Mills Rd to Halsey Rd. Turn west on to Halsey Rd. to Judd Rd/Highway 840. Turn north on to Judd Rd/Highway 840 and travel 4.5 kilometers to Cider Rd. Turn east on to Cider Rd. and go .2 kilometers. Take reading on the north side of the road. (8029 Cider St. Oriskany, NY)

4.98 km 150 mV Lat. 43° 8' 49.4" Long 75° 21' 22.5"

Item 9

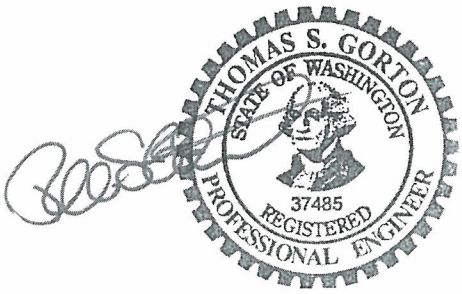
Direct Measurement of Power - WIBX

Common point impedance measurements were made at the phasor cabinet input jack adjacent to the common point current meter that is used to determine operating power. The impedance measured at this point was adjusted to a value of 50 +/- j0 Ohms.

Certification

This Engineering Report has been prepared personally by the undersigned or under my immediate supervision, and all representations are true and correct to the best of my knowledge. I am an experienced radio engineer whose qualifications are a matter of record with the Federal Communications Commission, I am an engineer in the firm of Hatfield & Dawson Consulting Engineers, LLC, and I am Registered as a Professional Engineer in the States of Washington and Oregon.

May 22, 2017



Thomas S. Gorton P.E.

APPENDIX A: FCC Form 302-AM